To: Burdick, Melanie[Burdick.Melanie@epa.gov]
From: Wilson, Kristina (DEQ)
Sent: Thur 4/5/2018 2:05:36 PM
Subject: *deliberative* Exempt under FOIA Sec.13(1)(m)
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***Do not publish – Deliberative interagency communication**

Melanie,

Attached are the comments that I have received in response to my request to review for potential constituent mobility and impacts to groundwater and/or discharges to surface waters within and near the proposed project site. These responses have not yet been reviewed or discussed by WRD; however, in consideration of your review and communications with the applicant, and also that I will be out of the office for the next few weeks, I want to provide these comments for your consideration. The email chain below outlines the basis for the review and my request. The review was of materials contained within the Part 632 application, with specific attention to Mining Permit Application - Volume IA.

Please let me know if you have any questions.

Kristi Wilson
Department of Environmental Quality
Water Resources Division
Upper Peninsula District Office
1504 W Washington Street
Marquette, MI 49855
906-236-0380

From: Chatterson, Eric (DEQ)
Sent: Thursday, April 5, 2018 8:24 AM
To: Wilson, Kristina (DEQ) <WilsonK17@michigan.gov>
Cc: Fish, Kim (DEQ) <FISHK@michigan.gov>
Subject: RE: Request for review and comment

Kristi,
I've attached my responses to the questions you posed. I have not included any review of the three dimensional numeric model other than some comments regarding their inappropriate us of a one dimensional analytical model to determine final GSI concentrations. I have looked over the numeric model and have many issues with it. However, my comments would to a large part parallel Dr. Hyndman's report and are not necessary to answer the questions you've asked. Let me know if you need anything else or need me to expand on anything I've provided.

Eric Chatterson
Geology Specialist
Water Resources Division
Michigan Department of Environmental Quality
517-281-5160

From: Wilson, Kristina (DEQ)
Sent: Tuesday, April 3, 2018 3:38 PM
To: Chatterson, Eric (DEQ) <CHATTERSONE@michigan.gov>
Cc: Fish, Kim (DEQ) <FISHK@michigan.gov>
Subject: Request for review and comment

Eric,

As a follow-up to our conversation yesterday, I am requesting review and comment on the Back Forty application to determine if there is a potential for discharge from the site that may impact ground and surface water and/or adversely impact aquatic resources. Below is my original inquiry and request for assistance:

The groundwater modeling report contains a section titled *Projected Constituent Concentrations at Groundwater- Surface Water Interface (attached).* The brief report identifies 8 elements that are contained in the proposed waste rock that will be backfilled and allowed to flood with the goal of creating anoxic conditions that will keep the sulfides in precipitation. The analysis of 8 elements: arsenic, cadmium, copper, lead, mercury, selenium, silver and zinc, were modeled to determine the concentrations of these constituents within the water of the backfilled pit. It is known that these constituents will be mobile in groundwater. The assessment shows the projected concentrations of those elements once they reach ground-surface interface (Menominee River). I have seen assessments of the Part 632 application minerology reports that state about 75% of the waste rock may contain pyrite and chalcopyrite in concentrations between 10% – 20%, which I understand will be the primary rock for subaqueous disposal, along with tailings that have been generated from onsite ore processing. When the pit is backfilled with waste rock to the base of the fractured bedrock and allowed to flood pore spaces within the waste rock and oxygen within the groundwater will react with the backfilled/ waste material. Specifically, I assume that the water would become acidic to some degree based on the sulfide content of the waste rock, oxygen in pore space and water, and the recent fracturing of this material. The increased acidity allows further dissolution of heavy metal elements that are known in the waste rock lithology which would in turn be carried through groundwater and may further increase the metal concentrations at groundwater- surface water interface (I recently reviewed a report from MN DNR that in controlled testing, Cu in solution can increase by a factor of 30 in low pH (2.5-3) subaqueous environments). Additionally, I believe that several of the elements addressed in this analysis are available to be carried in solution under anoxic or very low oxygen conditions, which is likely the extent of modeling in the attached analysis.

I am unsure if any portion of the Part 632 permit would have specifically reviewed this analysis in great detail, but I do not recall this being addressed in my limited involvement in the mining team. Also, the summary of the analysis in the groundwater modeling report submitted as supporting documentation for the wetlands application leads me to believe that the mobile minerology was only examined in a controlled (pH neutral) conditions. I believe that this information warrants a closer look to determine is there may be an increase in mobile metals that could discharge to wetlands and the Menominee River, altering water chemistry and affecting water quality.

Since I sent that inquiry, MDEQ has received a federal objection to the issuance of a permit with Part 404 authority. The WRD Resources Unit and EPA share concerns about the potential for constituent loading into wetlands and surface waters during operation, but more so post-closure. Specifically, the information from the wetlands application and limited Part 632 application review has resulted in questions about the potential for impacts to water quality in wetlands and streams on or adjacent to the proposed project site as a result of mobilized mineralization traveling through surface and ground waters. Additionally, through the limited information available in the wetlands, lakes and streams application, it appears as if waste rock and tailings are being proposed for subaqueous disposal in an area where there is a likelihood of transmissivity within bedrock and potentially fractured or weathered bedrock within close proximity to a discharging waterbody (Menominee River). I have been unable to locate any information that says that the pit will be lined prior to being backfilled with waste rock and tailings. In several application documents, it is stated that the purpose of backfilling the pit with waste rock and tailings is to dispose of the material in an anoxic environment to isolate the material from oxygen and reduce/ prevent acidification. As we have discussed, there is a level of dissolved oxygen in groundwater that will be moving through and around the backfilled pit. There is a proposed cutoff wall that will be located between a portion of the proposed pit and the Menominee River and is currently designed to transmit up to 123,000 gallons per day between the Menominee River and the pit during operations and will remain transmissive from the pit to the river after reclamation. Furthermore, there cutoff wall is proposed where the river is closest to the pit; however, there are areas where the proposed pit will be within 300 feet of the Menominee River without the benefit of the low transmissivity of the bentonite slurry wall.

There have been some changes from the Part 632 permit, including the site plan and waste disposal. The current project proposes to have comingled waste rock and thickened tailings stored on the surface during mining operations and then the comingled waste material (~45 Mt) will be placed into the pit as backfill for reclamation (see attached site plans). Approximately 15 Mt of comingled waste will be capped and remain on the surface in perpetuity. The current Part 632 permit requires a double liner with a leak detection system that will be located under all waste and operations areas. As of my last inquiry, the liner and leak detection system have not yet been designed nor have any plans been submitted. Also, I am unaware of where the liner will be disposed of as part of site reclamation.

Section 30106 of Part 301, Inland Lakes and Streams, requires that MDEQ "issue a permit if it finds that the project will not adversely affect the public trust or riparian rights." As part of our application review, the "department shall consider the possible effects of the proposed action upon the inland lake or stream and upon waters from which or into which its waters flow and the uses of all such waters, including uses for recreation, fish and wildlife, aesthetics, local government, agriculture, commerce, and industry. The department shall not grant a permit if the proposed project or structure will unlawfully impair or destroy any of the waters or other natural resources of the state. This part does not modify the

rights and responsibilities of any riparian owner to the use of his or her riparian water. A permit shall specify that a project completed in accordance with this part shall not cause unlawful pollution as defined by part 31."

Section 30311 of Part 303, Wetland Protection, requires the department to determine if the activity is otherwise lawful; with specific attention to other Parts and requirements of the NREPA. The department is also required to determine if the extent and permanence of the beneficial or detrimental effects which the proposed activity may have on the public and private uses to which the area is suited, including the benefits the wetland provides and the probable effects of each proposal in relation to the cumulative effect created by other or existing and anticipated activities in the watershed.

To this extent, I am requesting your review of the Back Forty application materials and your comments on:

- The likelihood of constituent mobility within ground and surface waters on and near the project site. Is there a possible effect on the water that flows into wetlands and streams on or near the proposed project site? If so, is it possible to categorize or anticipate the scope or effect the proposed action will have on these waters?
- Is there a possible discharge to the Menominee River on or near the project site? If so, is it possible to categorize or anticipate the effect the proposed actions will have on these waters?
- If there is a potential for constituent loading and discharge to ground and surface waters, would the action be otherwise lawful under NREPA. Specifically, would this activity as currently proposed required a permit to discharge under other applicable Parts (i.e. Pt 22, 31, NPDES) of NREPA?

In an effort to address the concerns shared by MDEQ and the EPA regarding impacts to water quality on or near the proposed project site, I issued a letter to the applicant requesting additional information to address this issue. I specifically requested that the applicant provide the following:

Demonstration and supporting documentation that the mine site plan is protective of water quality throughout the life of mine and post-closure.

- The groundwater modeling report addresses the mobilization of constituents. Provide further detail on the mobilization analysis including mobilization under acidic, reduced, and anoxic conditions.
- Provide information on the location and design of the containment liners and how the liner material will be managed post closure.
- Provide significant detail on the material that is proposed to backfill the mine pit consistent with the current proposed site plan which includes comingled tailings. Has any chemical analysis or leachate analysis been conducted for comingled tailings? Provide sufficient details of any analysis conducted as it relates to potential discharge impacts to ground and surface waters.
- Further clarify how the design of a low-permeability cutoff wall, in the location and configuration as currently proposed in the wetlands application, acts as a barrier to prevent outflow from the pit to the Menominee River.
    - Further detail how mobilized constituents in the backfilled pit will be restricted from entering the groundwater system and potentially discharging to the Menominee River or associated wetlands and streams.
- Provide further detail on the material that will be stored on the project surface in perpetuity.
    - Include detailed information on how the site is protective of water quality post-closure. Provide sufficient details on how the comingled waste rock and tailings will be contained in perpetuity as to not potentially expose reactive materials to weathering and oxidation.
- Identify if the outfall may potentially discharge material post-closure or if the proposed outfall will be removed as part of reclamation.

I will forward on pertinent information from the applicant if and when it becomes available. I appreciate your assistance and please let me know if you have any questions or would like to discuss this further.

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